In the Claims

1.**(canceled)**
2.**(canceled)**
3.**(canceled)**
4.**(canceled)**
5.**(canceled)**
6.**(canceled)**
7.**(canceled)**
8.**(canceled)**
9.**(canceled)**

10.**(currently amended)** A composition comprising a polymerizing agent including a molecular tag covalently bonded to a site on the polymerizing agent and a monomer including a molecular tag that is released upon monomer incorporation, where at least one of the tags has a fluorescence property that undergoes a change before, during and/or after each of a sequence of monomer incorporations due to an interaction between the polymerizing agent ~~tag~~ and the monomer ~~tag~~ and where the polymerizing agent lacks the ability to remove a previously incorporated monomer.

11.**(cancel**ed)
12.**(canceled)**

13.**(previously presented)** The composition of claim 10, wherein the polymerizing agent is a polymerase.

14.**(canceled)**
15.**(canceled)**

16.**(currently amended)** The composition of claim 10, wherein each of the monomers comprises a deoxynucleotide triphosphate (dNTP) and the monomer tag is covalently bonded either directly or through a linker to the ~~β and/or γ phosphate group~~ pyrophosphate moiety of each dNTP.

17.**(currently amended)** The composition of claim 10, wherein the ~~tags~~ at least one tag comprises a fluorescent tag ~~tags~~ and the fluorescence property comprises a duration, an intensity and/or frequency of emitted fluorescent light.

18.**(previously presented)** The composition of claim 17, wherein the fluorescence property is fluorescence resonance energy transfer (FRET) where either the monomer tag or the polymerase tag comprises a donor and the other tag comprises an acceptor and where FRET occurs when the two tags are in close proximity.

19.**(previously presented)** The composition of claim 13, wherein the polymerase comprises *Taq* DNA polymerase I having a tag attached to an amino acid at a specific amino acid position of the *Taq* DNA polymerase I, where the amino acid position is selected from the group consisting of 513-518, 643, 647, 649 and 653-661 of SEQ. ID No. 11, where the tag comprises a fluorescent molecule.

20.**(canceled)**
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48.**(canceled)**
49.**(canceled)**

50.**(currently amended)** A composition comprising a polymerizing agent including a molecular tag covalently bonded to a site on the polymerizing agent and a deoxynucleotide triphosphate (dNTP) including a molecular tag covalently bonded directly or through a linker to the ~~β and/or γ phosphate group~~ <u>pyrophosphate moiety</u> of the dNTP, where at least one of the tags has a fluorescence property that undergoes a change before, during and/or after each of a sequence of monomer incorporations due to an interaction between the polymerizing agent ~~tag~~ and the dNTP ~~tag~~.

51.**(previously presented)** The composition of claim 50, wherein the polymerizing agent is a polymerase or reverse transcriptase.

52.**(previously presented)** The composition of claim 51, wherein the polymerase is selected from the group consisting of *Taq* DNA polymerase I, T7 DNA polymerase, Sequenase, and the Klenow fragment from *E. coli* DNA polymerase I.

53.**(previously presented)** The composition of claim 51, wherein the reverse transcriptase comprises HIV-1 reverse transcriptase.

54.**(currently amended)** The composition of claim 50, wherein <u>at least one of</u> the tags comprise<u>s</u> <u>a</u> fluorescent <u>tag</u> ~~tags~~ and the fluorescence property comprises a duration, an intensity and/or frequency of emitted fluorescent light.

55.**(previously presented)** The composition of claim 54, wherein the fluorescence property is fluorescence resonance energy transfer (FRET) where either the monomer tag or the polymerase tag comprises a donor and the other tag comprises an acceptor and where FRET occurs when the two tags are in close proximity.

56.**(previously presented)** The composition of claim 52, wherein the polymerase comprises *Taq* DNA polymerase I having a tag attached to an amino acid at a specific amino acid position of the *Taq* DNA polymerase I, where the amino acid position is selected from the group consisting of 513-518, 643, 647, 649 and 653-661 of SEQ. ID No. 11, where the tag comprises a fluorescent molecule.

57.**(canceled)**
58.**(canceled)**
59.**(canceled)**
60.**(canceled)**
61.**(canceled)**
62.**(canceled)**
63.**(canceled)**

64.**(currently amended)** A composition comprising a polymerizing agent including a molecular tag covalently bonded to a site on the polymerizing agent and a deoxynucleotide triphosphate (dNTP) including a molecular tag covalently bonded directly or through a linker to the γ phosphate group of the dNTP, where at least one of the tags has a fluorescence property that undergoes a change before, during and/or after each of a sequence of monomer incorporations due to an interaction between the polymerizing agent ~~tag~~ and the dNTP ~~tag~~.

65.**(previously presented)** The composition of claim 64, wherein the polymerizing agent is a polymerase or reverse transcriptase.

66.**(previously presented)** The composition of claim 65, wherein the polymerase is selected from the group consisting of *Taq* DNA polymerase I, T7 DNA polymerase, Sequenase, and the Klenow fragment from *E. coli* DNA polymerase I.

67.**(previously presented)** The composition of claim 65, wherein the reverse transcriptase comprises HIV-1 reverse transcriptase.

68.**(currently amended)** The composition of claim 64, wherein at least one of the tags comprises a fluorescent tag ~~tags~~ and the fluorescence property comprises a duration, an intensity and/or frequency of emitted fluorescent light.

69.**(previously presented)** The composition of claim 68, wherein the fluorescence property is fluorescence resonance energy transfer (FRET) where either the monomer tag or the polymerase tag comprises a donor and the other tag comprises an acceptor and where FRET occurs when the two tags are in close proximity.

70.(**previously presented**) The composition of claim 66, wherein the polymerase comprises *Taq* DNA polymerase I having a tag attached to an amino acid at a specific amino acid position of the *Taq* DNA polymerase I, where the amino acid position is selected from the group consisting of 513-518, 643, 647, 649 and 653-661 of SEQ. ID No. 11, where the tag comprises a fluorescent molecule.

71.(**currently amended**) A composition comprising a polymerizing agent including a molecular tag covalently bonded to a site on the polymerizing agent and a monomer including a molecular tag covalently bonded directly or through a linker to the terminal phosphate of the monomer, where at least one of the tags has a fluorescence property that undergoes a change before, during and/or after each of a sequence of monomer incorporations due to an interaction between the polymerizing agent ~~tag~~ and the monomer ~~tag~~.

72.(**previously presented**) The composition of claim 71, wherein the polymerizing agent is a polymerase or reverse transcriptase.

73.(**previously presented**) The composition of claim 72, wherein the polymerase is selected from the group consisting of *Taq* DNA polymerase I, T7 DNA polymerase, Sequenase, and the Klenow fragment from *E. coli* DNA polymerase I.

74.(**previously presented**) The composition of claim 72, wherein the reverse transcriptase comprises HIV-1 reverse transcriptase.

75.(**canceled**)

76.(**currently amended**) The composition of claim ~~75~~71, wherein at least one of the tags comprises a fluorescent tag ~~tags~~ and the fluorescence property comprises a duration, an intensity and/or frequency of emitted fluorescent light.

77.(**previously presented**) The composition of claim 76, wherein the fluorescence property is fluorescence resonance energy transfer (FRET) where either the monomer tag or the polymerase tag comprises a donor and the other tag comprises an acceptor and where FRET occurs when the two tags are in close proximity.

78.**(previously presented)** The composition of claim 73, wherein the polymerase comprises *Taq* DNA polymerase I having a tag attached to an amino acid at a specific amino acid position of the *Taq* DNA polymerase I, where the amino acid position is selected from the group consisting of 513-518, 643, 647, 649 and 653-661 of SEQ. ID No. 11, where the tag comprises a fluorescent molecule.

79.**(currently amended)** A composition comprising a polymerizing agent including a molecular tag covalently bonded to a site on the polymerizing agent lacking 3' to 5' exonuclease activity and a monomer including a molecular tag that is released upon monomer incorporation, where at least one of the tags has a fluorescence property that undergoes a change before, during and/or after each of a sequence of monomer incorporations due to an interaction between the polymerizing agent tag and the monomer tag and where the site comprises a naturally occurring cysteine site or a cysteine replacement site in the polymerizing agent selected so that the site is less than or equal to about 50Å from a tag on each incorporating monomer and is a site that is not involved in the function of the polymerizing agent and the polymerizing agent tag is covalently bonded to the naturally occurring cysteine site or the cysteine replacement site through its SH group.

80.**(previously presented)** The composition of claim 79, wherein the site is less than or equal to about 15Å from a tag on each incorporating monomer.

81.**(previously presented)** The composition of claim 79, wherein the site is less than or equal to about 10Å from a tag on each incorporating monomer.

82.**(previously presented)** The composition of claim 79, wherein the polymerizing agent is a polymerase or reverse transcriptase.

83.**(previously presented)** The composition of claim 79, wherein the polymerase is selected from the group consisting of *Taq* DNA polymerase I, T7 DNA polymerase, Sequenase, and the Klenow fragment from *E. coli* DNA polymerase I.

84.**(currently amended)** The composition of claim ~~83~~82, wherein the reverse transcriptase

comprises HIV-1 reverse transcriptase.

85.**(currently amended)** The composition of claim 79, wherein each of the monomers comprises a deoxynucleotide triphosphate (dNTP) and the monomer tag is covalently bonded directly or through a linker to the ~~β and/or γ phosphate group~~ pyrophosphate moiety of each dNTP.

86.**(previously presented)** The composition of claim 85, wherein the tags comprise fluorescent tags and the fluorescence property comprises a duration, an intensity and/or frequency of emitted fluorescent light.

87.**(previously presented)** The composition of claim 86, wherein the fluorescence property is fluorescence resonance energy transfer (FRET) where either the monomer tag or the polymerase tag comprises a donor and the other tag comprises an acceptor and where FRET occurs when the two tags are in close proximity.

88.**(previously presented)** The composition of claim 83, wherein the polymerase comprises *Taq* DNA polymerase I having a tag attached to an amino acid at a specific amino acid position of the *Taq* DNA polymerase I, where the amino acid position is selected from the group consisting of 513-518, 643, 647, 649 and 653-661 of SEQ. ID No. 11, where the tag comprises a fluorescent molecule.

89.**(currently amended)** A composition comprising a polymerizing agent including a molecular tag covalently bonded to a site on the polymerizing agent and a monomer including a molecular tag covalently bonded to the monomer and that is released upon monomer incorporation, where at least one of the tags has a fluorescence property that undergoes a change before, during and/or after each of a sequence of monomer incorporations due to an interaction between the polymerizing agent tag and the monomer tag and where the site comprises a naturally occurring cysteine site or a cysteine replacement site in the polymerizing agent selected so that the site is less than or equal to about 50Å from a tag on each incorporating monomer and the polymerizing agent tag is covalently bonded to the naturally occurring cysteine site or the cysteine replacement site through its SH group.

90.**(previously presented)** The composition of claim 89, wherein the site is less than or equal to about 15Å from a tag on each incorporating monomer.

91.**(previously presented)** The composition of claim 89, wherein the site is less than or equal to about 10Å from a tag on each incorporating monomer.

92.**(previously presented)** The composition of claim 89, wherein the polymerizing agent is a polymerase or reverse transcriptase.

93.**(canceled)**

94.**(previously presented)** The composition of claim 92, wherein the polymerase is selected from the group consisting of *Taq* DNA polymerase I, T7 DNA polymerase, Sequenase, and the Klenow fragment from *E. coli* DNA polymerase I.

95.**(previously presented)** The composition of claim 92, wherein the reverse transcriptase comprises HIV-1 reverse transcriptase.

96.**(previously presented)** The composition of claim 89, wherein each of the monomers comprises a deoxynucleotide triphosphate (dNTP) and the monomer tag is covalently bonded directly or through a linker to the terminal phosphate group of each dNTP.

97.**(previously presented)** The composition of claim 96, wherein the tags comprise fluorescent tags and the fluorescence property comprises a duration, an intensity and/or frequency of emitted fluorescent light.

98.**(previously presented)** The composition of claim 97, wherein the fluorescence property is fluorescence resonance energy transfer (FRET) where either the monomer tag or the polymerase tag comprises a donor and the other tag comprises an acceptor and where FRET occurs when the two tags are in close proximity.

99.**(previously presented)** The composition of claim 94, wherein the polymerase comprises

Taq DNA polymerase I having a tag attached to an amino acid at a specific amino acid position of the *Taq* DNA polymerase I, where the amino acid position is selected from the group consisting of 513-518, 643, 647, 649 and 653-661 of SEQ. ID No. 11, where the tag comprises a fluorescent molecule.

100.**(previously presented)** The composition of claim 50, wherein the polymerizing agent lacks the ability to remove a previously incorporated monomer.

100.**(canceled)**

102.**(previously presented)** The composition of claim 64, wherein the polymerase lacks the ability to remove a previously incorporated monomer.

103.**(previously presented)** The composition of claim 71, wherein the polymerase lacks the ability to remove a previously incorporated monomer.

104.**(previously presented)** The composition of claim 89, wherein the polymerase lacks the ability to remove a previously incorporated monomer.

105.**(previously presented)** The composition of claim 79, wherein the site is less than or equal to about 25Å from a tag on each incorporating monomer.

106.**(previously presented)** The composition of claim 89, wherein the site is less than or equal to about 25Å from a tag on each incorporating monomer.

107.**(previously presented)** The composition of claim 13, wherein a polymerase comprises any molecule or molecular assembly capable of polymerizing a set of monomers into a polymer having a predetermined sequence of monomers and a monomer comprises any molecule capable of being incorporated into a polymer having a predetermined sequence of monomers by a polymerase.